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STANFORD, CALIFORNIA 94305 • (415) 321-1200

STANFORD UNIVERSITY SCHOOL OF MEDICINE
Department of Genetics

February 1, 1971

Dr. A. W. Hilberg
National Academy of Sciences
2101 Constitution Avenue
Washington, D.C. 20418

Dear Dr. Hilberg,

I attach herewith a document entitled "Cost Analysis of Genetic Diseases from Radiation; \$100 per man rad".

I am sending this to you in connection with the study by your NRC/NAS Committee of biological hazards of radiation. I am in the course of a more detailed revision of this document and the conclusions presented therein must be held to be quite tentative. I am submitting the present version at this time however in the knowledge that I may not have completed a more definitive statement in time to be useful to your committee. If I do I trust I will be able to enter a revised version.

I hope that this presentation will not generate an unnecessary amount of quibbling over the appropriate dollar value for I am quite willing to admit a considerable range of uncertainty by a factor of at least three and perhaps as much as ten. However, I do not believe that this will impair the usefulness of this approach and my main purpose is to provoke you and my colleagues to attempt a more precise definition of the cost of radiation hazards. I attempted to reach this evaluation through a reasonable objective procedure but I should take some comfort 1) in the fact that it is likely to be attacked severely by both sides in the present controversy and 2) that it coincides almost exactly with an independent estimate made by Dr. Bo Lindell of Stockholm on the utility of radiation-protection as perceived by health physicists. I imagine you already have access to his paper on this subject; if not Dr. Russell Morgan can provide it or you can write to him directly for it.

One can also criticize the very attempt to put a dollar figure on human health and I would myself insist that this is useful only for comparative purposes and has no place in a determination of absolute value. Some additional remarks on this point are included in another article also enclosed, which in turn refers to a paper by Dr. Thomas Schelling on the analysis of the economic value of human life which I most strongly commend to you.

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In my opinion the most serious impediment to rational public policy in this area is an ingrained confusion between personal and social hazards. The AEC, in my opinion, could establish much more restrained policies for average population exposure without serious impediment to the exploitation of nuclear energy. However, it appears to be inhibited from doing this because of an expected outcry from any small number of individuals who may be aggrieved at having a personal perhaps even transient exposure that falls above the threshold established for the average population. This point could well be illustrated by applying the calculated health cost rate of \$100 per man rad. (I put aside, for a moment, that most of the genetic cost will be socialized anyhow by diffusion through the gene pool.) The individual health cost may still be an integral fraction of that number and for sake of argument I will leave it at that value.

As I understand them, the current environmental standards for nuclear power plants allow for an exposure rate up to 0.5 rad at the boundary of the plant site. A very limited number of individuals may therefore be arbitrarily taxed to the extent of \$50 per annum by virtue of their exposure, sometimes involuntarily, to this dose. Measured as a personal cost we might decide either to provide for specific reimbursement (which is constructively accomplished in the economics of labor costs) or be willing to dismiss it as another of the small but inevitable fluctuations of injury that are the by-products of many forms of social action - zoning, selective service, and so on. On the other hand an economic cost of \$50 x 200 million or \$10 billion for the country at large would probably be regarded as an intolerable penalty. This kind of issue becomes very much more difficult to discuss when life and health rather than dollars are at stake, but we cannot evade the reality that connects these.

In sum, let me then stress that the purpose of this submission is to urge your group to attend to the questions that it raises much more than to ask it to adhere to these specific answers that I have given herewith.

Sincerely yours,

Joshua Lederberg
Professor of Genetics

JL/rr

cc: Dr. Crow
Dr. Wolff